1.0 Introduction

The Clouds and the Earth's Radiant Energy System (CERES) is a key component of the Earth Observing System (EOS). The CERES instrument provides radiometric measurements of the Earth's atmosphere from three broadband channels: a shortwave channel (0.3 - 0.5 microns), a total channel (0.3 - 100mm), and an infrared window channel (8 - 12mm). The CERES instruments are improved models of the Earth Radiation Budget Experiment (ERBE) scanner instruments, which operated from 1984 through 1990 on the National Aeronautics and Space Administration's (NASA) Earth Radiation Budget Satellite (ERBS) and on the National Oceanic and Atmospheric Administration's (NOAA) operational weather satellites NOAA-9 and NOAA-10. The strategy of flying instruments on Sun-synchronous, polar orbiting satellites, such as NOAA-9 and NOAA-10, simultaneously with instruments on satellites that have precessing orbits in lower inclinations, such as ERBS, was successfully developed in ERBE to reduce time sampling errors. CERES continues that strategy by flying instruments on the polar orbiting EOS platforms simultaneously with an instrument on the Tropical Rainfall Measuring Mission (TRMM) spacecraft, which has an orbital inclination of 35 degrees. In addition, to reduce the uncertainty in data interpretation and to improve the consistency between the cloud parameters and the radiation fields, CERES includes cloud imager data and other atmospheric parameters. The CERES instruments fly on the TRMM spacecraft, on the EOS-AM platforms and on the EOS-PM platforms. The TRMM satellite carries one CERES instrument while the EOS satellites carry two CERES instruments, one operating in a fixed azimuth scanning mode and the other operating in a rotating azimuth scanning mode.

A high-level view of the CERES Data Management System (DMS) is illustrated by the CERES Top Level Data Flow Diagram shown in Figure 1.0-1. Circles in the diagram represent algorithm processes called subsystems. Subsystems are a logical collection of algorithms which together convert input data products into output data products. Boxes represent archival data products. Two parallel lines represent data stores which are designated as nonarchival or temporary data products. Boxes or data stores with arrows entering a circle are input data sources for the subsystem, while boxes or data stores with arrows exiting the circles are output data products.

The CERES DMS produces science data products for use by the CERES Science Team, the Data Management Team, and for archival at the Langley Distributed Active Archive Center (DAAC). This document describes the data products that are shown in Figure 1.0-1. Various conditions control the production rate of each product. For example, some are produced for each instrument, some are produced for both instruments on a given satellite, and some are produced for the entire CERES mission. Table 1.0-1 lists each of these scenarios and assigns a one-letter key to identify them. The CERES products are written using one of three types of data structures: Hierarchical Data Format (HDF), binary format, or Hierarchical Data Format-Earth Observing System (HDF-EOS) format, which are described in Table 1.0-2 with corresponding one-letter keys. All data products distributed to external users are archived in HDF or HDF-EOS. The binary files are used within the CERES DMS and are not distributed.
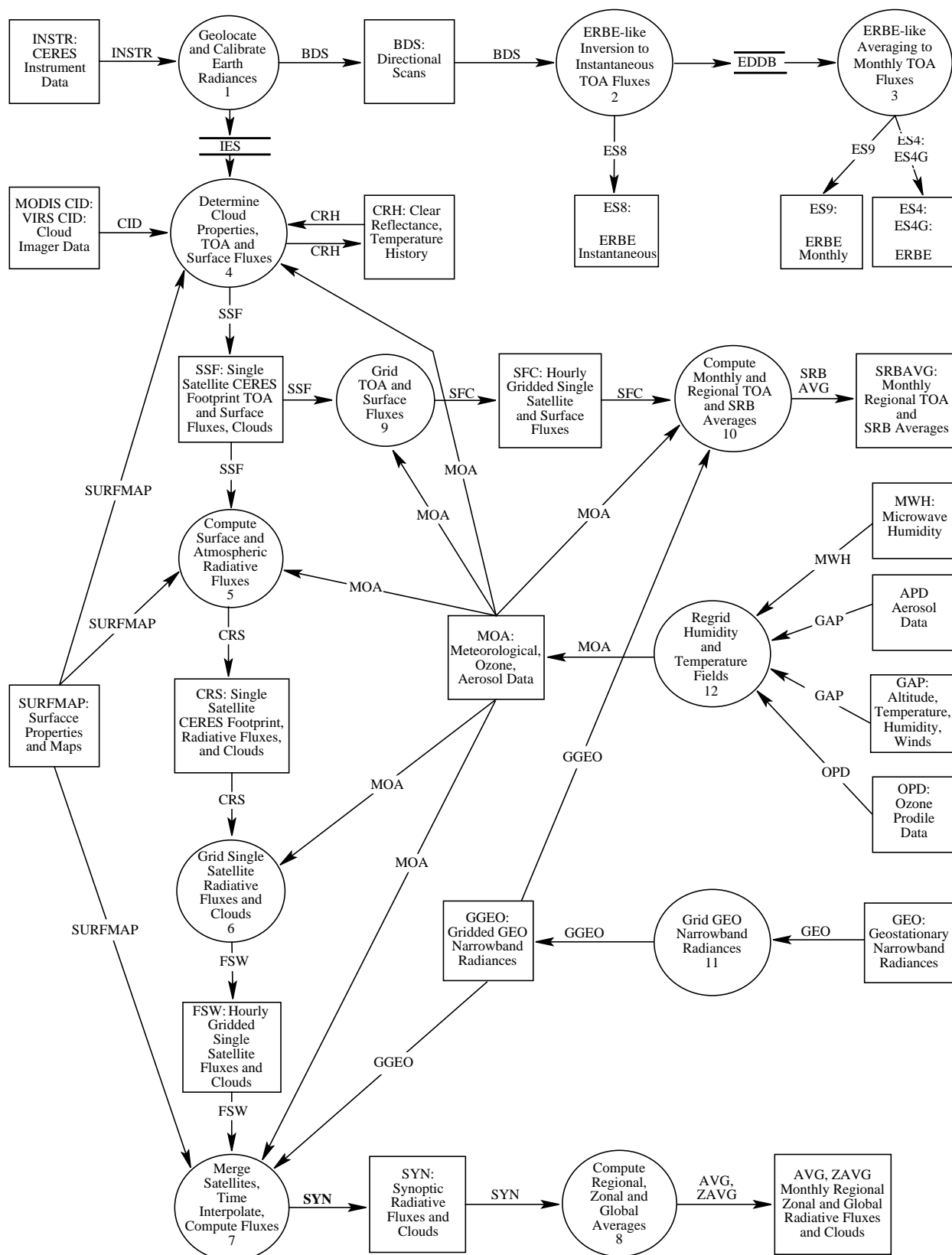
Figure 1.0-1. CERES Top Level Data Flow Diagram

Table 1.0-1. Scenario Key

Key	Scenario (Production Rate)
A	One per each instrument operating in fixed azimuth scan mode
B	One per each instrument operating in either azimuth scan mode (fixed or rotating)
C	One per each satellite (regardless of the number of instruments)
D	One per each instrument in fixed azimuth scan mode plus all instruments combined
E	One per mission (regardless of the number of instruments and satellites)
F	One per TRMM satellite (VIRS imager data)
G	One per EOS satellite (MODIS imager data)

Table 1.0-2. File Format Key

Format Key	Description
B	File written using binary file structure
E	File written using HDF_EOS structures
H	File written using HDF structures

There are three categories of products as listed in the summary Table 1.0-3 through Table 1.0-5.

Table 1.0-3: Archival Products: Output products which are permanently stored by the Earth Observing System Data and Information System (EOSDIS). Only products formatted in HDF or HDF-EOS format are available for distribution to the scientific community.

Table 1.0-4: Internal Products: Output products which are temporarily stored by EOSDIS (the storage duration may range from days to years) and are not available for distribution to the scientific community

Table 1.0-5: Ancillary Products: Input products which contain non-CERES data needed to interpret the CERES measurements

Each summary table lists the number of the subsystem which produces or uses the product, the CERES and EOSDIS product identification codes, a descriptive product name, the temporal production frequency, the size of one instance of the product, the total size of a full month of one instance of the product, a scenario key as described in Table 1.0-1, and a format key as described in Table 1.0-2. The total data volume for a given product can be derived from the monthly size and the scenario. The file sizes do not account for HDF overhead information.

The following sections of the catalog describe products from each of the three categories listed above. Each product description consists of a summary narrative followed by a listing of the parameters in the product.

Appendix A provides a list of Acronyms and Unit Definitions; Appendix B describes the metadata that are written to all CERES HDF products.

Table 1.0-3. Archival Products Summary

Sub Sys	Product Codes		Name	Frequency	Size, MB	Monthly Size, MB	Key	Size Key
	CERES	EOSDIS						
HDF or HDF_EOS Archival Products Available for distribution								
1	BDS	CER01	Bidirectional Scan	1/Day	783.8	24298	B	H
2	ES-8	CER02	ERBE-like Instantaneous TOA	1/Day	468.2	14514	B	E
3	ES-9	CER03	ERBE-like Monthly Regional Averages	1/Month	1014.7	1015	D	H
3	ES-4	CER13	ERBE-like Monthly Geographical Averages	1/Month	25.3	25	D	E
4	SSF	CER11	Single Satellite Footprint, TOA and Surface Flux, Clouds	1/Hour	302.0	224688	B	H
5	CRS	CER04	Clouds and Radiative Swath	1/Hour	319.7	237877	B	H
6	FSW	CER05	Monthly Gridded Single Satellite Fluxes and Clouds	1/Month	11750.0	11750	A	H
7	SYN	CER07	Synoptic Radiative Fluxes and Clouds	1/Day	636.7	19738	D	E
8	AVG	CER08	Monthly Regional Radiative Fluxes and Clouds	1/Month	1246.5	1247	D	E
8	ZAVG	CER15	Monthly Zonal and Global Radiative Fluxes and Clouds	1/Month	3.5	4	D	E
9	SFC	CER12	Monthly Gridded Single Satellite TOA and Surface Fluxes/ Clouds	1/Month	11750.0	5842	A	H
10	SRBAVG	CER06	Monthly TOA and SRB Averages	1/Month	2397.0	2397	D	E
Binary Archival Products for the CERES Data Management System Only								
1	INSTR	CERX00a	Instrument Production Data Set	1/Day	89.1	2762	B	B
4	CRH	CER16	Clear Reflectance History	1/Day	4804.0	148924	C	B
11	GGEO	CERX14	Gridded GEO Narrowband Radiances	1/Month	570.0	570	E	B
12	MOA	CERX06	Meteorological, Ozone, and Aerosol Data	1/Hour	13.3	9895	E	B

Table 1.0-4. Internal Products Summary

Sub Sys	Product Code		Name	Frequency	Size, MB	Monthly Size, MB	Key	Size Key
	CERES	EOSDIS						
1	IES	CER09	Instrument Earth Scans	1/Hour	33.7	25073	B	H
2	EDDB/ EID6	CERX02	ERBE-like Daily Data Base Data	1/Day	6.5	202	A	B

Table 1.0-5. Ancillary Products Summary

Sub Sys	Product Code		Name	Frequency	Size, MB	Monthly Size, MB	Key	Size Key
	CERES	EOSDIS						
4	CID_MODIS	CERX04	MODIS Cloud Imager Data	1/5mins	338.1	3,018,559	G	H
4	CID_VIRS	CERX05	VIRS Cloud Imager Data	1/Hour	91.0	67,704	F	H
4	SURFMAP	CERX07	Surface Map	Variable		158	E	B
11	GEO	CERX09	Geostationary Narrowband Radiances	8/Day/ Satellite	7.7	7600	E	B
12	APD	CERX10	Aerosol Profile Data	1/Month	.40	.40	E	B
12	GAP	CERX12	Altitude, Temperature, Humidity	4-8/Day	18.03	4474	E	B
12	MWH	CERX13	Microwave Humidity	1/Day	2.14	66	E	B
12	OPD	CERX11	Ozone Profile Data	1/Day	2.43	75	E	B